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The Soviet Gas Pipeline in Perspective

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Special National Intelligence Estimate

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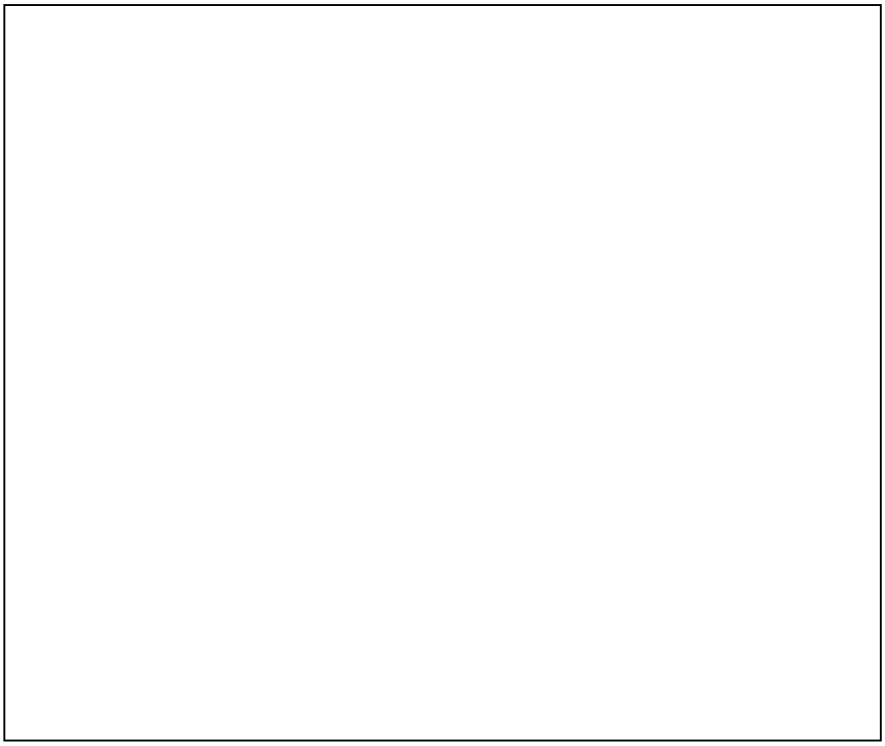

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THE SOVIET GAS PIPELINE IN PERSPECTIVE

Information available as of 16 September 1982 was used in the preparation of this Estimate.

THIS ESTIMATE IS ISSUED BY THE DIRECTOR OF CENTRAL INTELLIGENCE.

THE NATIONAL FOREIGN INTELLIGENCE BOARD CONCURS.

The following intelligence organizations participated in the preparation of the Estimate:

The Central Intelligence Agency, the Defense Intelligence Agency, the National Security Agency, and the intelligence organizations of the Departments of State, the Treasury, and Energy.

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SCOPE NOTE

This Special National Intelligence Estimate reviews the degree to which Western trade, technology, and energy relationships have assisted—and can in the future assist—the USSR to increase its military strength and impose unwanted burdens on the Western nations. The Estimate also assesses the potential impact on the USSR of the following courses of action:

— A strengthening of COCOM to assure that militarily sensitive technology is withheld from the Soviets.

— Avoidance of gas imports by the Europeans beyond the imports already agreed to as part of the Soviet export pipeline project.

— An embargo on some energy equipment and technology.

— An end to subsidized credits.

KEY JUDGMENTS

1. The USSR has used imports from the West to enhance its military capabilities:

— By obtaining goods and technology, legally and illegally, that contribute directly to the production and technical sophistication of weapon systems.

— By expanding the base of industries of particular importance to military production.

— And, more generally, by easing economic problems, thereby reducing the burden of defense.

2. The rapid increase in Soviet imports from the West in the 1970s was made possible by large windfall gains in export earnings due to the surge in oil prices and the willingness of Western countries to provide large credits, most of which were government guaranteed. The USSR is encountering growing economic difficulties, which will make it more difficult for Moscow to increase its imports from the West in the future. The outlook for most Soviet exports, including oil, is not favorable, and Western banks are unwilling to extend new long-term credits without government guarantees.

3. Only the increase in gas exports through the Siberia–to–Western Europe pipeline will prevent a marked decline in Soviet hard currency imports in the 1980s. The USSR almost certainly will be able to meet scheduled deliveries of gas through the pipeline without diverting Soviet equipment from domestic uses. Enough equipment has already been delivered, or soon will be, to enable the USSR to meet likely West European demand for gas until the late 1980s. By then, Moscow will probably be able to produce enough modern turbines and compressors to bring the line to full capacity, or will have found new sources of equipment for any it may have lost as a result of US actions. Meeting gas delivery commitments and becoming self-sufficient in turbines and compressors will impose costs on the Soviets in inefficiencies and shifts in resources and effort.

4. While gas exports are the most promising future source of hard currency, oil exports still account for some 50 percent of Soviet export earnings, and it is important for Moscow to minimize their future

decline. The USSR depends on the West for specialized oil exploration, drilling, pumping, and processing equipment. As its deposits of high-quality, accessible oil are depleted, the Soviets are turning to more remote oil and gas fields and more costly exploitation techniques. But they lag badly behind the West in the necessary technology. Without any access to Western equipment, the adverse impact on Soviet oil production could be as high as 10 percent of output by 1990.

5. Moscow's best hope of improving its strained hard currency position in the longer run is to secure the cooperation of Western Europe in building large new pipelines for the delivery of additional natural gas in the late 1980s or in the 1990s. With enormous gas reserves and a powerful incentive to earn more hard currency, Moscow is prepared to sell as much gas as the West Europeans will accept. There is potential uncovered gas demand in Western Europe to fill not only the Siberia–to–Western Europe pipeline now being built, but also a second and third strand during the 1990s. Development of these large gas projects currently requires Western pipe, equipment, and credit and markets as part of a package deal, although Soviet need for these Western products will diminish as Moscow develops its domestic gas equipment industry. Alternative sources of gas exist, notably in the Norwegian sector of the North Sea and in North Africa, although they are in general relatively costly and some are considered insecure.

6. It will be difficult to enlist Allied cooperation in restricting trade with the USSR. Beyond economic incentives, there are political considerations that fuel the West Europeans' reluctance to accept restrictions on trade and credits to the USSR. These include:

— Their desire to restore the detente climate in Europe and to avoid exacerbating East-West strains.

— Their desire to maintain access to Eastern Europe.

— Their belief that economic and other ties with the USSR will influence Soviet behavior.

These political considerations, combined with the economic incentive, continue to limit West European cooperation with the United States in restricting East-West trade.

7. The crux of the problem lies in developing with the West European countries a common understanding of the strategic implications of East-West trade. Such an understanding has been notably absent, but the chances of achieving it may be better now that the West Europeans are becoming more aware of the issues and the depth of US

concern. Allied leaders have asserted that they will not conduct economic warfare against the Soviet Union. But adequate analysis and discussion can lead to a common conclusion:

— That deficiencies in security policies among the Western Allies have resulted in Soviet acquisition of militarily important technology, financial subsidies, and, potentially, an important role in Western Europe's energy supply.

— That taking steps to withhold these benefits is merely prudent security policy which Allies owe to each other, and can be seen as self-protection rather than economic warfare.

8. Accordingly, Western countries might be willing to cooperate in:

— Developing and implementing broader and tighter COCOM restrictions.

— Agreeing to stricter limits on the terms and volume of government-supported credits.

— Developing other energy sources as an alternative to additional Soviet pipelines.

9. Making Western military-related technology, subsidized credit, and locked-in gas markets available helps the Soviet military buildup. Western governments would then be under increased pressure to raise defense costs, a move that requires heavy taxes, sometimes leads to deficit spending, and contributes to inflation and high interest rates. The United States is now committing some 6 percent of its economic effort and the European Allies some 4 percent of theirs to defend against a Soviet military threat that consumes 14 percent or more of their GNP. At the same time Western leaders are asking their citizens to carry a heavy defense burden they are pursuing policies that help the Soviets maintain a threat that adds to this burden.

10. This Estimate includes analysis of the potential impact of Western actions, including actions by Western Europe and Japan, on Soviet economic and military programs:

— The reduced availability of hard currency and energy would make more difficult the decisions Moscow must make among key priorities in the 1980s—sustaining growth in military programs, feeding the population, modernizing the civilian economy, supporting its East European clients, and expanding (or maintaining) its overseas involvements.

— While the cumulative impact of Western actions would clearly increase pressures on Soviet decisionmakers, we cannot judge how they would choose to spread such losses throughout the economy.

— Because economic growth will be slow through the 1980s, annual additions to national output will be too small to simultaneously meet the incremental demands that planners are placing on the domestic economy. Even now, stagnation in the production of key industrial materials is retarding growth in machinery output—the source of military hardware, investment goods, and consumer durables.

— Shortfalls in Soviet hard currency earnings due to Western actions probably would force further cuts in imports of machinery and equipment. Moscow fears that reductions in food imports would cause popular unrest and wants to avoid the bottlenecks that would be caused by cutting imports of industrial materials, such as steel.

— In the longer term, cuts in machinery imports would retard progress in modernizing a number of industrial sectors—steel, machine building, oil refining, robotics, microelectronics, transportation, and construction equipment—at a time when Moscow is counting on a strategy of limited investment growth and relying instead on productivity growth.

— Placing controls on energy-related equipment and technology would aggravate civilian industrial bottlenecks and, therefore, might cause civilian encroachment on defense production, such as a reallocation of some military-oriented metallurgical and machine-building facilities to produce the embargoed oil and gas equipment.

— The combination of enhanced COCOM controls and foreign exchange shortfalls would raise the cost of Soviet military modernization while at the same time weakening the industrial base for military production.

11. The relative impact of Western economic measures on the USSR can be estimated only as general orders of magnitude, as follows:

— Eschewing future gas projects—up to $10 billion a year in the 1990s.

— Denying all oil equipment and technology—about $10 billion a year for several years but then declining.

— Eliminating interest subsidies—less than $500 million a year.

In the long run, tighter COCOM restrictions on militarily sensitive technology (including technology and equipment that indirectly contributes to significant improvements in weapon systems) would perhaps be the most valuable action for the West. Such action would retard major improvements in Soviet weaponry, which the West would be forced to counter. While the dollar value of such action is difficult to estimate, the savings in terms of Western spending for defense annually would probably come to billions of dollars.

12. Moscow has the means to react to Western pressure by giving defense needs an even greater priority than at present and by pursuing a more truculent foreign policy. The Soviets meet their fundamental military requirements from their own large industrial base. Military programs, moreover, have great momentum and political support; they would not easily be scaled back, although the rate of modernization could be slowed. Even so, Moscow could not escape the reality that its basic choices between military and economic programs would become more difficult, at a time when a change in leadership might also make those choices less predictable.

DISCUSSION

I. THE SOVIET ECONOMY: THE TIME OF TROUBLES

1. The USSR is encountering increasingly severe and fundamental economic difficulties. Its rate of economic growth has slowed to less than 2 percent and the chances of any substantial improvement are slim. The causes of this slowdown are basically homegrown. Some of these—a drastic reduction in the growth of population of working age and the increasing difficulty of extracting and transporting energy and other resources—were inevitable. Other causes of the slowdown, however, appear to have their roots in the Soviet bureaucratic, command-type system, which seems to encounter great difficulty in coping with the increasingly sophisticated problems of a modern economy, and in the negative reaction of Soviet workers to what they consider a weakening of their standard of living and inadequate rewards for hard work and initiative within the system.

2. Although major systemic reforms could improve Soviet economic performance, at least in the long term, none are in the offing because Soviet leaders and party functionaries are unwilling to take any chances with an erosion of their political power and bureaucratic control. Events in Poland have reinforced this fear. Reform attempts have basically taken the form of bureaucratic reorganizations that put new clothes on old problems. Any substantial political change after Brezhnev is more likely to be in the direction of tightening controls and labor discipline than toward liberalization.

3. The slowdown in Soviet economic growth has been characterized by a dramatic decline in the productivity of investment and a much slower growth of labor productivity. Moreover, with some important sectors and industries, notably steel and grain, actually experiencing an absolute decline in output, major shortages have developed. Given an unwillingness to undertake major economic reforms, the Soviet leadership has used imports from the West to ease its problems and will continue to do so.

II. THE ROLE OF EAST-WEST TRADE

A. East-West Economic Interaction

4. Throughout its history the USSR has exploited economic interaction with the West both legally and illegally to expand its economic base, raise the technological level of its industry, relieve industrial bottlenecks, increase domestic food supplies, improve its military capability, and lessen the burden of defense. This exploitation reached its zenith in the 1970s as Soviet postwar productivity gains slowed and Moscow increasingly turned to the West for equipment and technology to spur its industry, and for grain to offset shortfalls in its inefficient farm sector. For its part, the West encouraged expansion of East-West trade by loosening export controls and expanding the availability of credit, often at subsidized interest rates. Moreover, the Soviets supplemented legal trade acquisitions of Western goods with a well-organized and centrally directed clandestine acquisitions program. The Soviet intelligence services and their East European surrogates played a major role in acquiring US and other Western military technology, embargoed equipment, and manufacturing technology for Soviet military and defense industrial needs.[1]

B. Profile of Soviet Trade

5. During the 1970s the value of Soviet hard currency imports from the West increased more than ninefold in current prices (see figure 1) and more than tripled in constant prices. Although still small in relation to gross national product (less than 4 to 5 percent of GNP), Soviet hard currency imports—especially machinery, ferrous metals, and foodstuffs—have played a critical role in many high-priority industrial, agricultural, and military programs, including those for raising energy production and meat

[1] For a description of this activity and its contribution to Soviet acquisition of Western technology, see NI IIM 82-10006, *The Technology Acquisition Efforts of the Soviet Intelligence Services*, June 1982 [redacted]

Figure 1
USSR: Hard Currency Imports, by Type

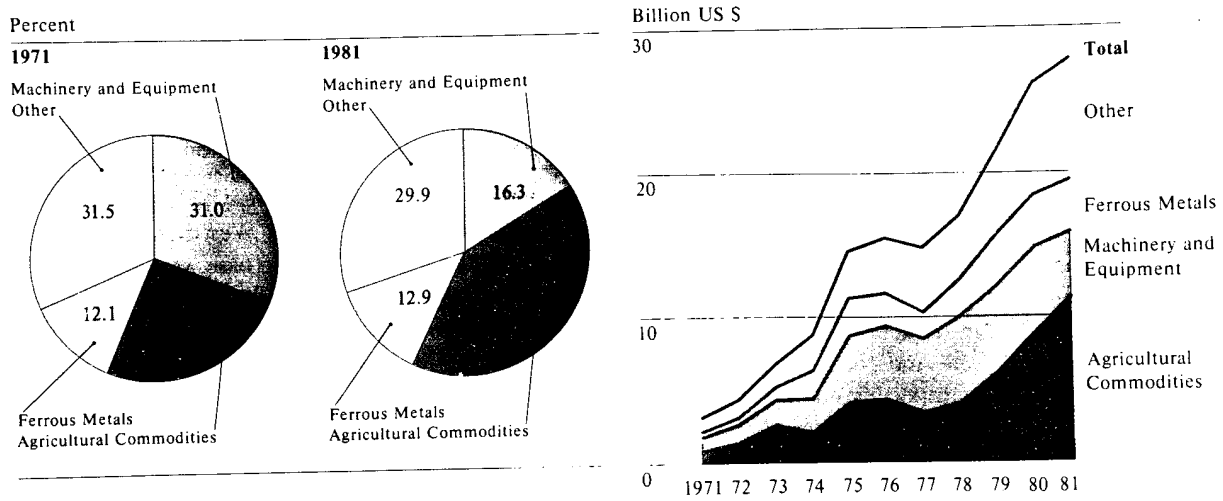

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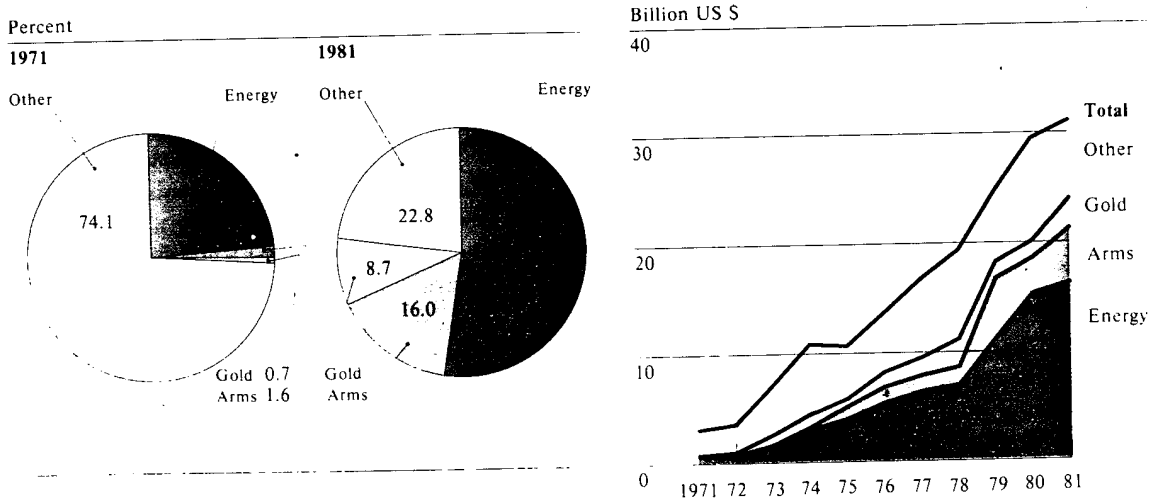
Figure 2
USSR: Hard Currency Earnings, by Source



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consumption and improving missile performance. Moscow's ability to sustain growing imports of Western capital goods and foodstuffs was boosted sharply by the runup in prices for oil and gold—two key sources of foreign exchange (see figure 2)—and a burgeoning market in the Third World for Soviet arms, the USSR's highest quality manufactured goods. Spurred by overtures from Western businessmen hoping to sell equipment and technology from underutilized capital goods industries, Moscow successfully negotiated a series of buyback deals with the West, involving purchases of Western plant and equipment financed at favorable rates and long-term maturities. As payment for the equipment, Moscow was to sell raw materials and semimanufactures at prices that generally reflected rising rates of inflation.

C. Soviet Gains From Trade

6. Imports from the West have contributed in a number of important ways to Soviet economic capabilities:[2]

— In the 1970s, imported chemical equipment, accounting for about one-third of all Western machinery purchased by the Soviets, was largely responsible for doubling the output of ammonia, nitrogen fertilizer, and plastics and for tripling synthetic fiber production.

— The Soviets could never have accomplished their ambitious 15-year program of modernization and expansion in the motor vehicle industry without Western help. The Fiat-equipped VAZ plant, for example, produced one-half of all Soviet passenger cars when it came fully on stream in 1975; and the Kama River truck plant, which is based almost exclusively on Western equipment and technology, now supplies nearly 50 percent of Soviet output of heavy trucks.

— Grain imports have averaged about 25 million tons per year since 1975. Without Western grain, Soviet meat consumption would have increased less in the early 1970s, and the fall in per capita consumption of meat in the late 1970s would have been far worse.

— Large computer systems and minicomputers of Western origin have been imported in large numbers—1,300 systems since 1972—because they (a) have capabilities that the Soviets cannot match, (b) use complex software that the Soviets have not developed, and (c) often are backed up by expert training and support that the Soviets cannot duplicate.

— Because of Soviet deficiencies in drill bits, pumps, and pipeline equipment, the USSR bought about $5 billion worth of oil and gas equipment alone in the 1970s, but these purchases have now largely ceased. Submersible pumps purchased from the United States, for example, may have added as much as 2 million barrels a day of capacity to Soviet oil production in recent years. Similarly, the Soviet offshore exploration effort would not be nearly as far along as it is without access to Western equipment and know-how. Meanwhile, West Germany and Japan have provided most of the large-diameter pipe needed for gas pipeline construction.

D. Consequences for Soviet Military Power

7. ***Direct Benefits to Military Weapon Systems.*** Acquisition of goods and technology from the West, either by legal or illegal means, enhances Soviet military programs in two principal ways: by making available specific technologies that permit improvements in weapon and military support systems and the efficiency of military and civilian production technology and by providing economic gains from trade that relieve bottlenecks and improve the efficiency of the economy and thereby reduce the burden of defense. Soviet military power is based fundamentally on the large size and diversity of the Soviet economy and the breadth of the Soviet technical and scientific base, on Soviet success in acquiring sophisticated technology in the West, and on the longstanding preferred status of the military sector.

[2] For a more extensive survey of these gains, see CIA Intelligence Assessment SOV 82-10012, *Soviet Economic Dependence on the West* (Appendix), January 1982

8. It has only been through an extraordinary allocation of resources to defense that the Soviets have attained their present military power. Soviet weapons are designed to minimize the requirements for technologies in which the USSR is deficient, but the Soviets have turned to legal and illegal acquisitions of Western technologies to make up for domestic shortcomings.

9. The Soviet armed forces are being modernized in nearly every category of weapon system. Soviet military hardware, which was at one time distinguished for its rugged simplicity, has been qualitatively improved until it is in some instances the technological equal of—if not superior to—military hardware produced in the West. Without Western technology, modernization and qualitative improvement of Soviet military equipment would have proceeded at a slower pace.

10. Through the acquisitions of Western technology and hardware, the Soviets have been able to satisfy certain R&D and production objectives:

— The reduction of engineering risk by following or copying proven Western designs.

— The reduction of R&D time by several years through the use of Western designs and technology and equipment.

— The incorporation of countermeasures early in the Soviet weapon development process.

In addition, the Soviets have been able to upgrade critical industrial sectors such as computers, microelectronics, and metallurgy, as well as to modernize Warsaw Pact industrial manufacturing capabilities. This has also helped to limit the rise in military production costs.

11. The Soviets commonly acquire even directly military-related hardware under COCOM license, ostensibly for commercial purposes. For example, advanced acoustic signal analyzers, legally purchased from Denmark in the middle 1970s, if used on the Soviets' own submarines, could significantly upgrade their tactical passive sonar capability to detect and classify Western submarines. In addition, two huge floating drydocks purchased from the West for civilian use have been diverted to strategic and tactical naval shipbuilding and repair.

12. Legal purchases of Western machinery, equipment, and manufacturing technologies have found a wide range of applications in Soviet weapons production. (See inset below.)

Soviet Military Uses of Legal Imports

— US-origin gear-cutting machines were used to produce military trucks, wheeled armored vehicles, and components for missile transporters.

— Western gear-cutting machines were used in the development of the latest Soviet military heavy-lift helicopter, the MI-26.

— High-technology automatic lathes, milling machines, and other machine tools from Sweden and West Germany and two large rolling mills, one Japanese and one West German, are probably used in the construction of titanium hulls for the A-class nuclear attack submarine, the world's fastest and deepest diving submarine.

— US-origin grinding machines were used in manufacturing small, high-precision bearings suitable for ballistic missile guidance operation.

— An electron beam drilling device of West German origin was used to improve the quality of Soviet turbine blades.

— Austrian-origin hot and cold rotary forges (some 26 in all) were used to produce artillery tubes and small-arms barrels.

— US blind riveting and French aerospace welding technology equipment was used to produce advanced Soviet interceptor aircraft.

— Western tungsten arc welders were used to fabricate armor plate for Soviet tanks.

— US technology acquired for the Cheboksary tractor plant was used to make a new 12-cylinder tank engine.

13. The Soviets have historically relied on clandestine acquisitions of foreign technology to provide some of the most critical inputs needed in the development of their weapon systems. (See inset on next page.) Although they pay high premiums for illegal imports, the total value is small relative to total hard currency imports of $30 billion.

Soviet Military Uses of Illegal Imports

— Information on the US Redeye shoulder-fired surface-to-air missile facilitated the development of the Soviet SA-7. During the prototype construction of the SA-7, bearings acquired from Japan were used pending the subsequent development of indigenous bearings of suitable quality.

— In the mid-1960s the Soviets copied the Texas Instruments 7400 series monolithic integrated circuit (IC) to produce the series 155 (Logika 2) IC. This IC was then used to develop the ES-1030 computer, whose design and architecture were copied from the IBM-360/40. The ES-1030 has been used in a number of military applications.

— Materials acquired on the US TACAN navigation system were adapted for use in the MIG-25 Foxbat navigation system.

— Data acquired on the US C-5 transport have apparently been used in the development of the new AN-400 heavy transport under development at the Antonov Design Bureau in Kiev.

14. ***Other Benefits to Military Programs.*** Western technology and equipment also enable the Soviets to improve industries that indirectly support weapon developments. Even though the defense industrial ministries perform the bulk of weapons development and production, they rely on the nondefense industries to supply specific products such as missile-handling equipment, and to supply most of the basic tools of weapons development and production—machine tools, sensors, and computer software. Because most defense industries also produce for the civilian economy, imports of Western machinery for the civilian sector also help to prevent greater encroachment of civilian requirements on defense production facilities.

15. Traditionally the Soviets have lagged behind the West in their ability to produce modern electronic devices—more so perhaps than in any other area of military technology. In particular, they have not been able to produce the highly sophisticated precision equipment they have needed in volume, and their R&D methods are too ponderous and react too slowly to stay current in a technology that moves with expressway speed.

16. As a result, the Soviets undertook a major effort in the early 1970s to obtain Western equipment for the manufacture of integrated circuits. They have now acquired several hundred million dollars' worth of machinery that, if combined, would enable them to equip 16 to 20 medium-size production lines capable of producing advanced devices, including large-scale integrated circuitry with sufficient capacity to meet all current Soviet military requirements. This production base is known to be used to support development of military equipment such as strategic missiles, antiballistic missile systems, sensors and weapons for antisubmarine warfare, and computers for military applications. It is also a key technological capability for continued advances in Soviet military electronics.

17. Western manufacturing technologies have helped the USSR produce materials with critical military applications, especially in metallurgy. A US firm built a turnkey plant to produce rock-drill bits that included extensive tungsten-based powder metallurgy technology. The US equipment and expertise provided have enhanced the Soviets' ability to make the tungsten powders needed to produce new and more lethal tungsten-alloy penetrators for their kinetic-energy, antitank projectiles. Sweden, Japan, and West Germany also have sold the Soviets powder metallurgy pressing technology similar to that used by Western manufacturers to make tungsten-alloy penetrators. The French firm Creusot-Loire is helping to build a massive steel plant in Novolipetsk, which will produce about 7 million tons of specialty steel when operating at full capacity in 1986. Much of the plant's output will be electroslag and vacuum-arc remelt steels of the kind used in submarine hulls, artillery tubes, and tank armor.

E. The Hard Currency Squeeze

18. At a time when Soviet economic difficulties are growing, the USSR's hard currency earnings are declining. In the past few years, Moscow has used its hard currency earnings primarily to buy the goods necessary to cover major domestic shortages. As a result of four bad grain crops in succession, food imports have risen to about $12 billion, or about 40 percent of total hard currency imports, reflecting the high priority the Soviet Government gives to at least maintaining supplies of major foods in the consumer market. There has also been a large expansion of steel imports, especially large-diameter pipe and special steels, because the Soviet steel industry lacks the

diversity to support all the major Soviet economic and military programs. These priority needs for hard currency imports have squeezed Soviet imports of Western machinery and equipment, which have fallen by about 40 percent in constant prices since 1977, with most of the decline having occurred in the past two years.

19. During the past 18 months or so, the USSR has experienced a severe foreign exchange squeeze as a result of a soft oil market, low prices for other Soviet export commodities, and unexpected expenditures on imported grain and on aid to Poland. Although the cyclical causes of this deterioration are only temporary, the longer term outlook for a rise in Soviet hard currency earnings in the 1980s is poor. Unlike the 1970s, when enormous oil price increases financed the bulk of the threefold increase in the volume of Soviet hard currency imports, the outlook for oil prices for at least several years in the 1980s is for a decline in real terms, if not in nominal terms. At the same time, the volume of Soviet oil exports is likely to be squeezed by at least slow growth in domestic consumption coupled with stagnant or declining production. Market conditions for most other Soviet exports do not look very promising either. In contrast to the 1970s, therefore, likely market conditions in the 1980s point to a decline in the purchasing power of Soviet hard currency exports. (See inset below.)

Prospects for Major Hard Currency Exports

- The increase in gas exports now in train will essentially constitute an offset to the likely decline in oil exports.
- The dramatic decline of oil revenues of Middle East producers such as Libya makes it unlikely that some major Soviet arms clients will be able to continue paying in hard currency.
- Exports of timber and wood products are squeezed between rising domestic consumption and the rising costs of exploiting timber in increasingly remote areas.
- Exports of minerals (platinum-group metals, nickel, copper, aluminum, chromite, manganese, diamonds, lead, and zinc) present a mixed picture—some trending up, others down.
- Exports of Soviet manufacturers are not finding ready acceptance in Western markets, and Moscow has not made the large investment required in quality control and marketing to make rapid progress.

20. ***Role of Western Credit.*** Western credits to the USSR, often government guaranteed, have been an important factor in the rise in Soviet imports. Since the USSR began large purchases of Western technology in the early 1970s, Moscow has used official and officially backed credits to finance one-third of its imports of plant, equipment, and large-diameter pipe from the West. Annual Soviet drawings on government-backed credits jumped from an average of $475 million in 1971-73 to nearly $2 billion by 1975, but have held at $2.5 billion per year since 1978. The volume of new commitments fell from a peak of nearly $4 billion in 1975 to less than $2 billion by 1980, reflecting falling Soviet orders for Western machinery and equipment.

21. The combination of rising debt service payments and level drawings has steadily reduced the net resource inflow to the USSR on official credits from a maximum of $1.2 billion in 1976; by 1980-81 there was a small net outflow from the USSR as debt service exceeded drawings.

22. Subsidized interest rates and lengthy maturities on most government-backed credits have helped Moscow conserve some scarce hard currency. Interest rate subsidies on new official loans reached a record level in 1981—on the order of $300-400 million—as commercial rates in most Western countries averaged 5 percentage points more than those charged on official loans. Last October's increase in the OECD interest rate guidelines and a possible reclassification of the USSR into the "rich country" category will reduce the subsidy, but only slowly.

23. In 1977-80, contracts for sales of large-diameter pipe and chemical plants were the primary beneficiaries of government-backed financing (see table 1). Pipe contracts backed by official financing totaled at least $2.5 billion, and approximately $300-500 million in contracts for other energy-related equipment also received official guarantees or credits. Officially guaranteed credits covered $3 billion in contracts for complete plants; two-thirds of these commitments were for chemical plants, with the remainder going mostly for steel mills ($170 million), aluminum plants ($150 million), and factories for machinery and consumer goods ($690 million together). OECD data report some $3 billion in official credit commitments for machine tools and other plant and equipment in 1977-80. Small amounts of credits have financed

Table 1

Official Credit Commitments to the USSR in 1977-80, by Industrial Sector [a]
(million US dollars)

	Total	Canada	West Germany	France	Italy [b]	United Kingdom	Japan [c]
Total	8,992	208	2,673	2,683	775	728	1,450
Complete plants	2,993		718	1,184		423	300
Steel	168		44	124			
Chemical	1,900		432	790		363	300
Hydro and thermal power	44		37	7			
Wood, pulp, and paper	33						
Aluminum, copper, and zinc	162			162			
Other	686		205	101		60	
Machinery and equipment	3,077	200	741	981	775	305	
Ships	32						
Telecommunications	87			87			
Road vehicles	2	2					
Oil and gas equipment	305	6		299			
Pipe	2,496		1,214	132			1,150

[a] Value of contracts supported by official credits with an original maturity of more than five years.
[b] Presumably includes credits for pipe exports.
[c] OECD reports for all countries except Japan. Data for Japan are based on announcements of credits backing specific contracts.

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orders for telecommunications equipment, ships, and earthmoving vehicles.

24. France and Italy probably provide more than half of the interest rate subsidies. In 1981, as a result of these subsidies, the Soviets saved an estimated $150 million in interest payments to France and $110 million in interest payments to Italy—or some 15 to 20 percent of the value of the machinery exports of these countries to the USSR. If all official debt had been contracted at commercial rates, the Soviets would have had to pay $35 million more to the United Kingdom and perhaps $20 million more to Japan. Any West German subsidy was undoubtedly quite small because only 1 to 3 percent of exports to the USSR have been financed through West Germany's AKA rediscount facility. When the Soviets demand interest rates below market levels on Hermes-guaranteed credits, the German exporter usually covers the financing cost by charging higher prices. There is, however, an implicit subsidy involved in providing government guarantees for private credits—namely, the interest premium the private lenders would require if there were no guarantee.

25. More recently, however, Moscow has had to recognize that it cannot count on a large increase in Western credits to expand its hard currency imports. Although the Soviet hard currency position is still relatively strong (the debt service ratio is only about 17 percent), the prospective stagnation in export volume means that any attempt to achieve a substantial increase in imports would quickly push up hard currency debt to an unacceptable level. Indeed, a large inflow of Western capital would be required just to maintain the current volume of imports, and this would result in a doubling of debt by 1985 and a quadrupling by 1990. The debt service ratio would approach 30 percent by 1985—a level high enough to cause concern in financial circles—and reach dangerous proportions (45 percent) by 1990.

26. ***Implications of Hard Currency Squeeze.*** Even a moderate fall in hard currency imports could greatly complicate Soviet economic problems and make allocation decisions more painful. Large agricultural imports are essential to the growth of meat consumption even in normal crop years. Expansion of gas consumption and exports requires massive purchases of Western large-diameter pipe. Large imports of metals and chemicals are an integral part of Soviet economic plans. Orders of Western machinery and equipment have already been sharply curtailed; fur-

ther cuts would certainly impinge on priority programs in steel, transportation, agriculture, and heavy machine building.

III. OIL AND GAS: FUTURE KEY TO IMPORTS

27. If Moscow is to avoid a severe squeeze on its hard currency import capacity, with painful repercussions in the economy, it must find new ways of increasing its exports to the West. This means developing new capacity as well as finding new markets. By far the most promising potential for export expansion is in the massive resources of West Siberian natural gas. Proved reserves of Siberian gas are ample to cover any likely increase in total energy consumption in the USSR during the 1980s and 1990s as well as a large expansion in gas exports to the West. Although transport costs are high, production costs of Soviet gas are low, and the USSR is willing to accept a low rate of return on natural gas investment, making it likely that Soviet gas can continue to be offered to Western Europe at prices lower than those of most alternative sources. Moreover, while gas exports are the only promising future source of hard currency, oil exports still account for some 50 percent of Soviet export earnings, and it is important for Moscow to minimize their future decline. An important factor affecting future oil production and exports will be the degree of access to Western oil equipment and technology.

28. The dispute over the pipeline has occupied much of the policy discussion of East-West interaction within the Western Alliance, partly because it involves both political and strategic considerations—US "political" export controls affect the pipeline, which the United States also opposes for "strategic" reasons. Some perspective on Soviet energy developments, problems, and prospects is necessary for an understanding of the potential impact of Western actions.

A. The Soviet Energy Problem

29. Moscow is encountering rapidly rising costs in the production and distribution of oil and coal:

— The USSR is running a race between declining oil production in its older fields and increasing development of new ones. Requirements for drilling and fluid lift are rising rapidly, and the Soviets are moving to develop offshore deposits and introduce more sophisticated recovery techniques to prevent a decline in oil output.

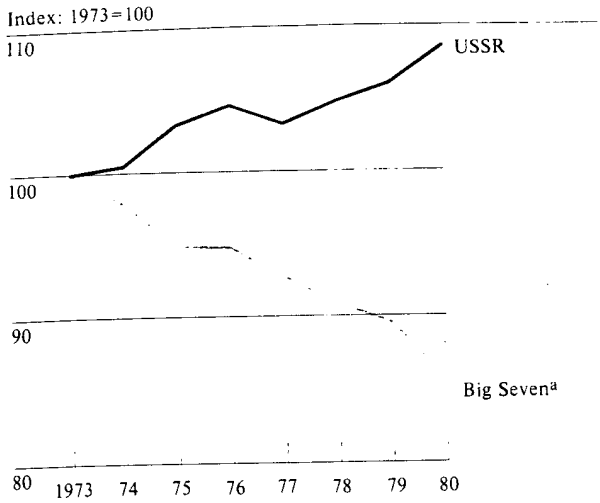
— The coal industry is suffering from mine depletion, increasing mine depths, reduced seam thickness, and declining heat value per unit of raw coal produced. Although the USSR possesses enormous coal reserves in Siberia, the Soviets are ill prepared to exploit them—a result of neglecting the coal industry since the late 1960s, when Soviet policy put increasing emphasis on development of oil. Thus, development of coal deposits east of the Urals is now constrained by lack of progress on coal enrichment technology, unresolved technical problems relating to transmission of electricity produced at mine-mouth power stations, and lack of sufficiently developed transportation capacity in the east.

— By 1990, gas will be the largest single source of Soviet energy, with production at roughly 700 billion cubic meters—the equivalent of 11.6 million barrels a day (b/d) of oil. Reaching this level, however, will be a costly undertaking because it will require large amounts of Western pipe and equipment. The Soviets are building an unprecedented six major 56-inch (1,420-millimeter) trunklines from Siberia—each one a larger undertaking than the Alaskan oil pipeline—even though labor and equipment are already stretched thin. The massive outlays for pipeline construction, and provision of needed infrastructure—such as roads, all-weather ports, and electric power facilities—will strain Soviet investment resources.

30. In contrast to the West, the Soviet record on energy consumption has been abysmal. Soviet energy consumption has continued to grow more rapidly than gross national product (see figure 3). If the relationship between energy consumption and GNP in the USSR had followed the trend in the "Big Seven" since 1973, the USSR's annual consumption of energy would be roughly 5 million b/d oil equivalent lower than it was in 1980.

31. A major reason why conservation gains are difficult in the USSR is that most of them require

Figure 3
USSR and Big Seven: Energy/GNP Ratios



[a] The "Big Seven" include the United States, Canada, West Germany, France, Italy, the United Kingdom, and Japan.

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massive investments to modernize and renovate industrial and power-generating facilities—a program that will itself consume significant quantities of fuel. Soviet transportation is already reasonably energy efficient and does not have the potential for large savings such as those achieved relatively rapidly in many Western countries. Residential and commercial energy use is comparatively small. The largest energy savings, therefore, must come in the industrial sector. Producing and introducing energy-efficient equipment, however, will require most of the decade.

32. The pattern of energy production and use is shown in table 2. About one-fourth of Soviet oil production is exported, of which about 900,000 b/d is sold to the West for hard currency. Gas exports are also becoming substantial.

B. Importance of the Export Pipeline

33. The Soviet Union has been delivering gas to Western Europe since the early 1970s. Between 1968 and 1975 Moscow concluded eight "gas for pipe" agreements with Austria, France, Italy, and West Germany. Under these agreements, the USSR purchased with long-term government-backed credits about 9 million tons of large-diameter pipe and other gas-related equipment. To repay the loans, the USSR agreed to long-term gas delivery contracts, some of which extend to the year 2000.

34. In 1979, Moscow began negotiating with the West Europeans for construction of an export gas pipeline with a planned gross capacity of 35 billion cubic meters annually (580,000 b/d oil equivalent). Although two pipelines were originally discussed, present contracts call for only one strand. Even so, this Siberia–to–Western Europe natural gas pipeline is the largest East-West trade project to date (see thumbnail description in figure 4). The pipeline could deliver nearly 30 billion cubic meters to West Germany, France, Italy, Austria, and other countries. Gas pur-

Table 2

USSR: Estimated Energy Balance, 1981
(million b/d oil equivalent)

	Production	Apparent Consumption	Net Exports		
			Total	For Hard Currency	Other
Total	28.3	23.8	4.5	1.5	3.0
Oil [a]	12.2	9.0	3.2	0.9	2.3
Natural gas	7.7	6.7	1.0	0.5	0.5
Coal	6.6	6.4	0.2	0.1	0.1
Other [b]	1.8	1.7	0.1	NEGL	0.1

[a] Including gas condensate.
[b] Including production of hydro and nuclear electricity, peat, oil shale, fuelwood, and electricity exports.

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Siberia-to-Western Europe Natural Gas Pipeline*

Figure 4

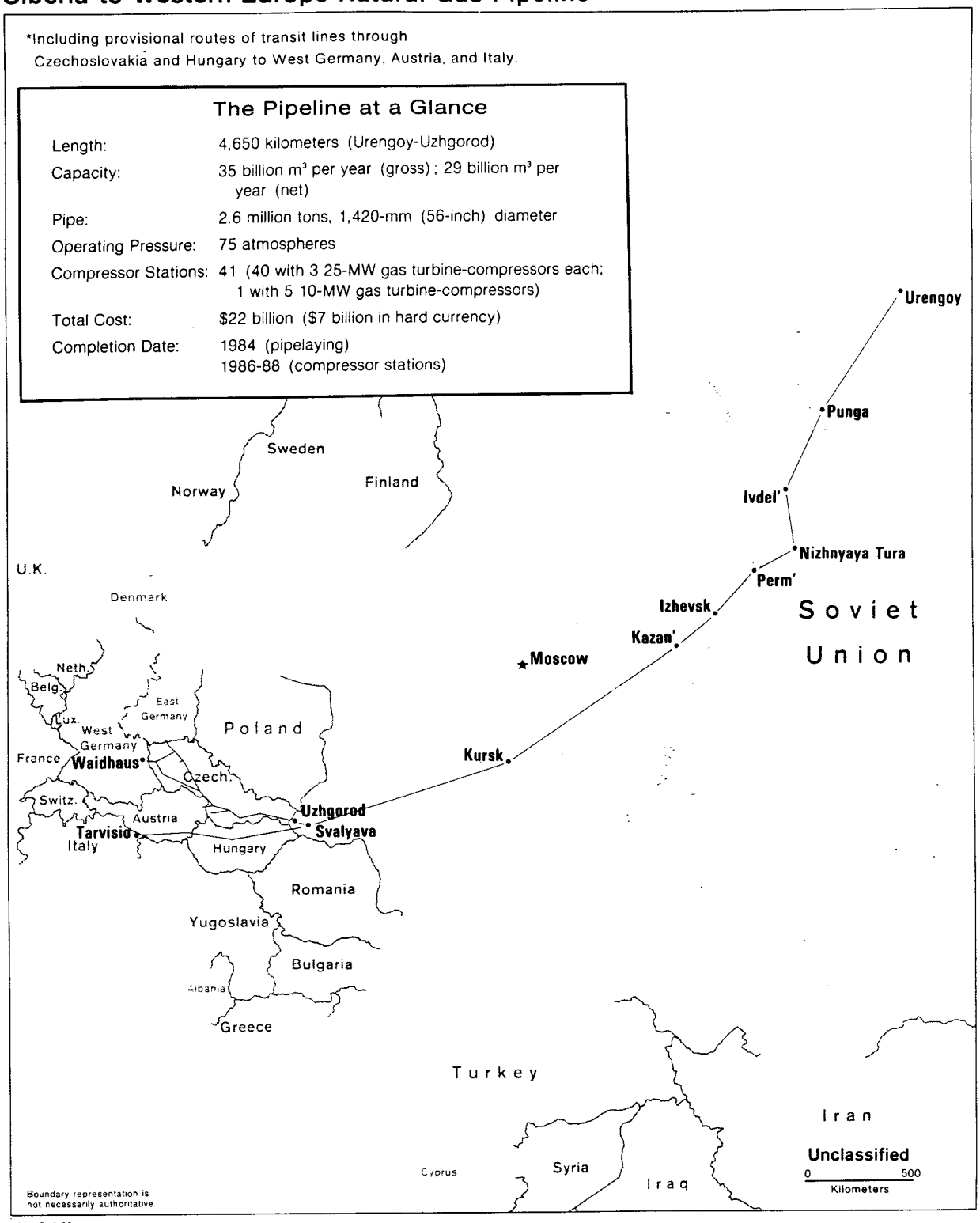

Table 3

Projected Soviet Gas Deliveries to Western Europe [a]
(billion cubic meters)

	1980	1984	1985	1987	1988
Austria:	2.4	3.0	3.5	4.0	4.0
Existing contracts	2.4	2.5	2.5	2.5	2.5
New contracts	—	0.5	1.0	1.5	1.5
France:	5.2	4.0	4.0	9.0	12.0
Existing contracts	5.2	4.0	4.0	4.0	4.0
New contracts	—	—	—	5.0	8.0
Italy: [b]	7.0	7.0	7.0	12.0	15.0
Existing contracts	7.0	7.0	7.0	7.0	7.0
New contracts	—	—	—	5.0	8.0
West Germany: [c]	10.9	15.0	18.0	22.5	22.5
Existing contracts	10.9	12.0	12.0	12.0	12.0
New contracts	—	3.0	6.0	10.5	10.5
Switzerland:	—	—	—	—	0.1
Existing contracts	—	—	—	—	—
New contracts	—	—	—	—	0.1
Total:	25.5	29.0	32.5	47.5	53.6
Existing contracts	25.5	25.5	25.5	25.5	25.5
New contracts	—	3.5	7.0	22.0	28.1

[a] Excluding Finland; amounts of annual offtake under the new contracts are subject to reduction by up to 20 percent under scheduled semiannual negotiations with the Soviets.

[b] Italy has not yet signed the new purchase contract.

[c] Excluding potential deliveries of 0.8 billion cubic meters to West Berlin.

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chase agreements were signed in late 1981 for deliveries over a 25-year period with West German and French utilities and in June 1982 with Austria's Ferngas. Initial exports of 3-5 billion cubic meters per year (50,000 to 80,000 b/d oil equivalent) are to start in 1984, and full deliveries are scheduled to begin in 1987-88.

35. The USSR will be able to use a combination of the existing Soyuz export pipeline, domestic trunklines, and East European transit lines to begin initial gas deliveries on schedule. With the phasing-in of the new gas export pipeline, total Soviet gas deliveries to Western Europe—under older contracts as well as the new export pipeline contracts—could reach about 33 billion cubic meters per year (550,000 b/d oil equivalent) in 1985 and then in 1988 rise to as much as 54 billion cubic meters per year (nearly 900,000 b/d oil equivalent) (see table 3).[3] Annual gas deliveries to Eastern Europe would increase by several billion cubic meters if 10 percent of the projected Soviet exports are delivered to Czechoslovakia and Hungary as transit fees.

36. Besides the gas sales, the pipeline project involves:

- Soviet purchases of large-diameter pipe (about $2 billion), mostly from West Germany and Japan.
- Soviet purchases of turbine compressors and related equipment ($5 billion), from the major West European countries.
- Government-guaranteed credits (at least $7 billion) repayable in eight to 11 years with a three-year grace period on repayment of principal, and interest rates averaging 7 to 8 percent, well below market.

37. The gas export pipeline project is one of six 56-inch gas pipelines that the Soviets hope to complete in the current Five-Year Plan (1981-85). Two of the five

[3] The information available on the deliveries under the new contracts is still extremely sketchy, so the timing depicted in table 3 should be considered a rough estimate of the delivery profile.

domestic lines have already been laid. In addition to the export pipeline, Moscow hopes to lay by 1985 three more lines from the Urengoy gasfield to the European USSR, each 3,000 to 4,000 kilometers long. The six new trunklines from West Siberia account for roughly half of the total of 48,000 kilometers of gas pipelines planned for construction in 1981-85.

38. If the Soviets believe they cannot count on Western imports of pipe and compressors, they will develop their own capability more rapidly. Certainly by the 1990s they would be able to produce enough 16- or 25-megawatt turbines to move gas through long-distance pipelines, such as the export line currently being built. The Soviets would prefer to continue to import some of this equipment from the West, however, because it can be paid for with gas exports and it maintains the commercial ties between Western Europe and the USSR.

39. Because of the weak export prospects outlined above, the pipeline is vital to Moscow's prospects for earning sufficient hard currency beyond the mid-1980s to avoid a major drop in its import capacity. Annual revenues from the pipeline deal alone should reach $5½ billion (in 1981 dollars) in the early 1990s when all credits are repaid, and total gas earnings (including existing contracts) could be roughly $10½ billion.

40. The USSR also calculates that the increased future dependence of the West Europeans on Soviet gas deliveries will make them more vulnerable to Soviet coercion and will become a permanent factor in their decisionmaking on East-West issues. The Soviets, moreover, have used the pipeline issue to create and exploit divisions between Western Europe and the United States. In the past, the Soviets have used West European interest in expanding East-West commerce to undercut US sanctions, and they believe successful pipeline deals will reduce European willingness to support future US economic actions against the USSR.

41. ***Follow-On Gas Projects.*** The factors that led the Soviets to conclude the recent Siberia–to–Western Europe gas deal—huge gas reserves and continued need for hard currency earnings—almost certainly will lead to a proposal for new export contracts that will require additional export pipelines. If a second strand of the new export pipeline were built, Soviet revenues from gas sales would rise in the 1990s to more than $15 billion per year (1981 prices). Soviet behavior in negotiating the first contracts suggests that additional gas supplies would be offered at a base price near the low end of the market. By accepting a relatively low price initially, the Soviets would be able to increase their market penetration and still secure hard currency earnings.

42. Indeed, potential demand in Western Europe could support purchases of at least an additional 60 billion cubic meters (about 1 million b/d oil equivalent) of Soviet gas by the year 2000—enough for two additional pipelines of the magnitude of the one now being built. This potential will be realized, of course, only if alternative new sources of gas for Western Europe are not developed.[4]

C. Alternative Energy Sources

43. The development of such alternative Western energy sources—particularly the large gas resources of the North Sea—will take too long to have much effect on the West European demand for Soviet gas in the 1980s but could determine whether Western Europe seeks additional Soviet gas in the 1990s. At best, an additional 9-15 billion cubic meters of new supplies could be delivered by 1990 through increased Dutch and Norwegian production; estimated Norwegian gas reserves are by themselves sufficient to permit a large expansion of production in the 1990s. Several African and Middle Eastern countries also have the potential to increase gas exports during the 1990s.

44. Continental gas import requirements are expected to increase by about 70-80 billion cubic meters in the 1990s as demand grows and domestic production declines. Under favorable circumstances, North Sea and Dutch gas could meet about 80 percent of these requirements, or about 60 billion cubic meters. North African gas could provide about 45-60 billion cubic meters. Supplies from the Middle East and North Africa would be substantially less secure from disruption than would gas from West European sources. Moreover, the likely investment costs of developing and transporting this gas would be extremely high. (See table 4.)

[4] See SNIE 3/11-82, *Western Alternatives to Soviet Natural Gas: Prospects and Implications*, 28 May 1982

Table 4

Proposed Non-Soviet Gas Projects for Western Europe

Proposed Projects	Start	Volume (billion cubic meters)	Production and Transport Cost [a]	Reliability	Considerations	Likelihood of Project Implementation
Norway						
Sleipner	1990-95	12-15	High	Secure	Preliminary negotiations for sale of gas now under way with both UK and continental buyers.	Probable
Troll	1994-95	35-40	High	Secure	Technical problems must be overcome to develop the field.	Probable
Tromsa	1995-99	5-10	High	Secure	Oslo would like to see development in northern region to balance regional development.	Probable
Algeria					West Europeans view Algeria as an unreliable supplier. Production problems in the mid-1980s will reinforce this view, particularly if Algeria maintains a militant price stance.	
Italian pipeline expansion	1990	6	Low	Unreliable	Requires additional compressors.	Probable.
Italian pipeline II	1995	12-18	Low	Unreliable	Requires new series of trans-Mediterranean pipelines.	Some possibility
Segamo pipeline I	1990	4	Medium	Unreliable	Will soon be technically feasible to construct; initial volumes will be expanded if demand warrants.	Some possibility
Segamo pipeline II	1995	16	Medium	Unreliable		Some possibility
Nigeria						
Bonny LNG						
Trains 1-3	1990	7.5	Medium	Secure	Project was canceled in early 1982, but we believe Nigerian revenue needs will force a smaller project to go forward and be later expanded.	Probable
Trains 4-6	1995	7.5	Medium	Secure		Some possibility
Trans-Sahara pipeline	1990	250	Medium	Insecure	Nigerians dismiss this project because of potential transit and security problems.	Highly improbable
Cameroon						
Kribi LNG						
Trains 1-2	1990	75	Medium	Secure	French firms are actively involved in the project.	Probable
Train 3	1995	35	Medium	Secure	Only if additional reserves are discovered.	Some possibility

Footnote at end of table.

Table 4 (Continued)

Proposed Non-Soviet Gas Projects for Western Europe

Proposed Projects	Start	Volume (billion cubic meters)	Production and Transport Cost [a]	Reliability	Considerations	Likelihood of Project Implementation
Libya						
LNG	1990	3-7	Medium	Fairly reliable and secure	Will probably be built only as a replacement for Brega plant.	Some possibility
Italian pipeline	1995	14	Low-medium	Fairly reliable and secure	Only if offshore reserves (recently discovered by an Italian company) of 140 billion cubic meters or more are proved up and adjacent oilfields are developed beforehand.	Some possibility
Egypt						
LNG I	1990	3	Medium	Secure	Will require discovery of reserves.	Some possibility
LNG II	1995	6	Medium	Secure		Some possibility
Ivory Coast						
LNG	1995	7	Medium	Secure	Even if recent gas discoveries are proved up, the gas is likely to be used domestically.	Some possibility
Qatar						
Ras Laffan LNG I	1995	9	High	Secure	Temporarily shelved because of failure to find buyers.	Probable
West European pipeline	1990	17	High	Insecure	The regional political tensions, high transit fees, and large costs make this project difficult to implement.	Highly improbable
Iran						
IGAT-Turkey-LNG	1995	7	Medium-high	Politically insecure and unreliable	Possible export to Western Europe.	Some possibility
IGAT-West European pipeline	1995	17	Medium-high	Politically insecure and unreliable	Italian and West German firms considering project.	Some possibility

[a] Takes account of field development, operating, and transport costs amortized at 15 percent. Excludes wellhead value of gas. Low cost is defined as costs under $3 per billion BTUs delivered to Western Europe; medium cost, $3 to $5; high cost, above $5.

45. Multinational cooperation will be critical if sizable new volumes of North Sea gas are to be brought to the Continent by the early 1990s. Projects to boost North Sea gas exports will require enormous capital investments—$15-20 billion may be needed to develop Norway's Troll gasfield alone—and will have to compete with other North Sea oil and gas projects for a share of the development funds to be spent during the next decade. Interest rate subsidies similar to those offered for the construction of the Soviet pipeline could substantially speed development of North Sea gas reserves; an interest rate subsidy of about 2 percentage points could cut 15 percent from total investment costs.

46. Cooperative agreements to transport gas to the marketplace will be equally important. A gas swap agreement, for example, would involve increased Norwegian gas deliveries to the United Kingdom in exchange for delivery of equal volumes of British gas to the European Continent. This could save $1-2 billion in facilities investments and could shorten leadtimes by two to three years. Similarly, Dutch participation in a coordinated gas marketing strategy could vastly simplify Norway's efforts to increase future gas sales.

47. Although the commercial advantages of such arrangements are sizable, numerous political obstacles must still be overcome, including Norwegian reluctance to become overly dependent on hydrocarbon development. Other critical factors determining the timing and size of new North Sea projects include:

— ***Tax policies.*** The current UK tax regime is a serious deterrent to the development of small fields. Norway's petroleum taxes are also high, and development has been slowed further by short drilling seasons and generally cautious government policies.

— ***Market prospects.*** An unprecedented decline in West European gas consumption during the last two years has clouded the outlook for the future size of the European gas market. Present uncertainties could cause North Sea producers to hesitate before launching new projects, especially in view of the possibility of being undercut by cheaper Soviet gas.

— ***Revenue needs of producing countries.*** If the budget crisis in the Netherlands worsens, pressures to increase gas sales will increase. Similarly, Norway may be inclined to speed gas development because of lowered expectations of future oil revenues.

D. Soviet Dependence on Western Oil Equipment

48. The USSR faces increasing dependence on the West in developing and processing its oil resources in the 1980s. The Soviets already have drilled most of the relatively shallow, easily located, accessible oil deposits. They specifically need Western seismic and well-logging technology to bolster their ability to explore for oil reserves in the 1980s (see annex). The Soviets plan to nearly double the amount of drilling for oil and gas in 1981-85 and to increase it further in the late 1980s, but their drilling productivity is poor by international standards. Thus, Western rigs, drill pipe, tool joints, drill bits, blowout preventers, and drilling-fluid technology could substantially aid Soviet drilling efforts.

49. The Soviet oil industry faces rising fluid-lift requirements in the 1980s, as the amount of water produced along with oil increases. According to Soviet plans, a large additional volume of fluid—well over 6 million barrels a day—must be lifted in 1985 simply to maintain production of oil at the 1980 level of 12 million b/d. To handle the high volume of fluid, the Soviets plan to double the number of wells producing oil with the help of submersible pumps and gas-lift equipment. Imported equipment could boost the productivity of this effort because the capacity and quality of Soviet-made submersible pumps and gas-lift equipment are low.

50. The Soviets' least explored prospective areas for new petroleum discoveries are offshore, and exploration and development of the continental shelf will contribute to their oil production in the 1990s. The USSR already has received substantial assistance from the West, and continued assistance could speed development in the Caspian Sea and Arctic areas.

51. The United States is the preferred supplier of most types of oil and gas equipment throughout the world because it is by far the largest producer, with the most experience, the best support network, and often the best technology. In some products—for example, large-capacity down-hole pumps—the United States has a world monopoly. The position of most

US suppliers in the changing world market has been preserved by establishing overseas subsidiary firms and licensees during the past decade. These offshore operations deterred new competition from "wedging in" to overcrowded markets. Up to now, the learning curve for new competitors has been very steep and entrance has been too costly in a highly cyclical market. Booms in demand often trigger new investment in additional capacity, often only to be followed by a drying up of the market when production begins 18 to 24 months later. Risk is high for any newcomer because the period following the boom is marked by fierce price competition until the excess capacity is worked off. Nonetheless, in recent years the US share of the market decreased, even before the US embargo was imposed.

IV. OPPORTUNITIES FOR WESTERN GOVERNMENT POLICY

A. Possible Restrictions

52. Western governments, at considerable cost to themselves, could increase Soviet economic difficulties by:

- Restricting Soviet access to Western oil and gas equipment and technology.
- Eliminating subsidies, including government guarantees, on credits to the USSR.
- Using their influence to discourage Western firms from entering into large-scale energy projects with the USSR.
- Taking steps to shrink the potential Western energy market for Soviet gas by developing alternative energy sources.

53. The effectiveness of such steps depends on many factors, including the scope of the action, the degree of cooperation among the Western Allies, and the duration of the restriction. It is highly unlikely, for example, that US Allies will participate in an export embargo, except in response to specific political events, with the result that such an embargo is likely to be partial and/or short-lived. On the other hand, there may be a better chance of gaining Allied cooperation on credit policy and on development of alternative energy sources, especially if common ground can be found on a "strategic" policy concerning East-West economic relations.

54. The following sections consider the impact of possible Western measures on:

- The construction of the export pipeline and the planned Soviet gas deliveries to Western Europe.
- The development of Soviet oil production.
- The development of new gas export projects.

B. Impact on the Gas Export Pipeline [5]

55. We believe that the USSR will succeed in meeting its gas delivery commitments to Western Europe through the 1980s and will do so without significant diversion of domestic resources from other sectors. Deliveries could begin in late 1984, as scheduled, by using existing pipelines, which have excess capacity of at least 10 billion cubic meters annually.

56. The Soviets probably can begin deliveries through the new pipeline in 1985 or 1986. With the 22 turbines built with the GE-made rotors already shipped from Western Europe, or about to be shipped, and by operating compressor stations without standby units, Moscow could deliver through the new pipeline about 70 percent of the planned annual throughput of nearly 30 billion cubic meters. Turbines using an additional 40 rotors—the number Alsthom-Atlantique contracted before the US embargo to build for the Soviet Union under GE license—could boost throughput to more than 90 percent of capacity. For reliability of pipeline operation and periodic maintenance, however, the Soviets might use some of the available turbines as standby units, thereby reducing throughput somewhat.

57. It is highly unlikely that full capacity will be needed until near the end of the decade, because West European gas demand is lagging substantially. Before the end of the 1980s the Soviets will be able to fully equip the pipeline using either imported or domestic equipment. By then they will probably be able to produce 25-megawatt turbines, in spite of a history of troubles. If necessary, the USSR could divert construction crews and compressor-station equipment from new domestic pipelines to the export pipeline or even

[5]For a detailed survey of the export pipeline's status, see CIA Intelligence Assessment SOV 82-10120/EUR 82-10078, *Outlook for the Siberia-to-Western Europe Natural Gas Pipeline*, August 1982

Table 5

Estimated Impact of Embargo by NATO Countries and Japan on Selected Oil Equipment

	Impact of Current US Sanctions	Nature and Degree of Estimated Impact of Embargo Imposed by NATO Members and Japan
Exploration equipment	Minimal	Reduction in exploration success in existing producing areas as well as unexplored regions, with substantial impact in the 1990s. Short run: Minimal Long run: Substantial
Offshore drilling equipment	Moderate	Moderate delays in offshore drilling operations. Short run: Moderate Long run: Moderate
Drill bits, drill pipe, tool joints, other drilling equipment	Small	Small short-run impact on drilling program. Short run: Small Long run: Small
Fluid-lift equipment	Small	Potentially moderate in short run, depending on Soviet import efforts. Short run: Moderate Long run: Moderate
Equipment for producing and processing high-pressure, high-sulfur gas	Substantial	Critical for production of high-sulfur Central Asian gas and high-pressure gas in West Siberia and elsewhere. Short run: Substantial Long run: Moderate
Oil refinery secondary processing units	Small	Potentially substantial if Soviets proceed with plans to upgrade refineries, but they have concluded no recent agreements for this equipment.

dedicate a domestic pipeline for export use to ensure capacity adequate to meet contractual delivery obligations. This diversion would be costly, but it is highly unlikely to be required on a large scale. More likely, Moscow would be able to meet Western Europe's demand with little or no loss in domestic gas deliveries.

C. Impact on Oil Development

58. The impact of export restrictions on oil development in the USSR would depend critically on the development of domestic oil equipment manufacturing capabilities. While some improvement is likely over the decade, we do not believe that it will come in time to offset the need for the kinds of Western equipment shown in table 5:

— Continued denial of US oil and gas equipment would retard Soviet oil production, particularly in offshore drilling and in production of high-pressure, high-sulfur gas.

— Denial of all oil equipment by all NATO countries and Japan would have a substantially larger impact, which could reach as much as 1.0 million b/d by the end of the decade—almost 10 percent of total oil production.

D. Impact on Future Gas Export Deals

59. The most damaging measures to the Soviets in the long run would be inflicted by Western agreements that restrict further agreements either to buy Soviet gas or to sell Moscow oil and gas equipment. Under such conditions the USSR would lose its main source of new hard currency earnings in the 1990s.

E. Impact on the Soviet Economy and Military Capability

60. Shortfalls in Soviet oil and gas production would directly affect the USSR's ability to earn hard currency. To protect its hard currency earnings, Moscow would be tempted to further cut energy exports to Eastern Europe. And the importance to the Soviet economy of substantial hard currency imports is such that, in the event of a major production shortfall, allocations of oil and gas to domestic Soviet uses would be reduced.

61. ***Consequences for the Economy.*** Energy shortfalls would affect the Soviet economy and might lead to cuts in imports. The USSR would be reluctant to cut food imports because this would risk popular unrest and, in any event, would probably adversely affect incentives and productivity.

62. Further reductions in imports of machinery and equipment would hinder industrial modernization and productivity. Cuts in allocations of oil and gas, or of imported materials such as steel, would create production bottlenecks, cause some plant capacity to be unused, and disrupt supplies in many parts of the economy. The bottlenecks would diminish and perhaps eventually disappear as the Soviets took steps to conserve the scarce products, to substitute other products, and to adjust the pattern of demand.

63. Given all the uncertainties surrounding the scope and duration of Western measures, and the way the Soviets would cope with and adjust to these measures, quantitative measures of impact can at best be viewed as illustrative orders of magnitude.

64. The effect of Western measures on potential Soviet energy output (measured in dollars at world market prices) would approximate the following magnitudes (in billions of dollars per year):

	Short Run (2-3 Years)	Medium Run (4-10 Years)	Long Run (Over 10 years)
Pipeline Sanctions			
US alone	Small	0-small	0
Oil Equipment Restriction			
US alone	2-6	2-6	Small
All Allies	7	12	Declining
No New Gas Projects (beyond current pipeline)	0	0-5	5-10

65. In the hypothetical case of a full Western embargo on all oil and gas equipment, including large-diameter pipe, the cost to the Soviets would rise substantially—reaching roughly $36 billion annually by 1990. This case illustrates the particular importance of Western linepipe to the Soviet gas program over the next several years; in the 1990s this dependence will decline as the Soviets master serial production of multiwall large-diameter pipe.

66. The impact of these shortfalls on Soviet GNP might be a multiple of the above losses, especially during the period when bottlenecks could not be avoided. The potential aggregate economic impact could be characterized as follows:

- Insignificant, in the case of US unilateral controls aimed only at the export pipeline.
- GNP by the end of the decade would be 2 to 3 percent less in the case of a sustained Allied embargo of oil equipment, but the impact would be much smaller in the more likely case that US Allies provide limited, if any, cooperation.
- In the hypothetical case that includes an embargo on pipe, the Soviets would incur a loss in GNP of 3 to 4 percent by 1990.
- After 1990 the effects of Western policies could be enhanced considerably if follow-on Soviet gas projects were squelched.

67. Soviet costs on the order of 3 percent of GNP by 1990 are significant. Such a loss of GNP would be equivalent to all the investments made in housing construction in 1980, or nearly 40 percent of all industrial investments in 1980, or more than 25 percent of military expenditures in 1980. These measures indicate only the order of magnitude of forgone Soviet GNP and do not equate to potential cuts in investment or defense spending. While the cumulative effect of such losses would clearly increase pressures on Soviet decisionmakers, we cannot judge how they would choose to spread such losses throughout the economy.

68. Additional Western actions such as restricting subsidized government-guaranteed credits could raise the cost to the Soviets of Western assistance by about $400-500 million a year. Credit extensions themselves

would probably fall sharply if government guarantees were withheld, as most bankers are reluctant to extend large long-term credits without government guarantees.

69. In the long run, tighter COCOM restrictions on militarily sensitive technology (including technology and equipment that indirectly contributes to significant improvements in weapon systems) would perhaps be the most valuable action for the West. Such action would retard major improvements in Soviet weaponry, which the West would be forced to counter. While the dollar value of such action is difficult to estimate, the savings in terms of Western spending for defense annually would probably come to billions of dollars.

70. ***Consequences for Military Programs.*** The reduced availability of hard currency and energy would also make more difficult the decisions Moscow must make among key priorities in the 1980s—sustaining growth in military programs, feeding the population, modernizing the civilian economy, supporting its East European clients, and expanding (or maintaining) its overseas involvements. Because economic growth will be slow through the 1980s, annual additions to national output will be too small to simultaneously meet the incremental demands that planners are placing on the domestic economy. Even now, stagnation in the production of key industrial materials is retarding growth in machinery output—the source of military hardware, investment goods, and consumer durables.

71. If growing resource stringencies and hard currency shortages prompt Soviet leaders to cut back on imports, it seems likely that, in true bureaucratic tradition, initial efforts would be implemented in a broad-brush fashion affecting a number of Soviet ministries across the board. The very top-priority programs no doubt would be spared, but many relatively high-priority ones, including some military programs, could be hurt at least indirectly.

72. Even in the longer term, cuts in machinery imports would retard progress in modernizing a number of industrial sectors—steel, machine building, oil refining, robotics, microelectronics, transportation, and construction equipment—at a time when Moscow is counting on a strategy of limited investment growth and relying instead on productivity growth.

73. Hard currency shortages by themselves probably would have little effect, however, on Soviet acquisition of Western technology and equipment which directly facilitate qualitative improvements in Soviet weapon systems. These inputs are so important to Moscow that the necessary hard currency will certainly be allocated to them, and the value required probably is at most a few hundred million dollars a year. Such military-related acquisitions, legal and illegal, can be prevented only through a broadening and tightening of COCOM controls.

74. Reduced Soviet petroleum and gas output would aggravate civilian industrial bottlenecks and, therefore, might cause civilian encroachment on defense production, such as a reallocation of some military-oriented metallurgical and machine-building facilities to produce the embargoed oil and gas equipment. Technical requirements, however, could force significant "upstream" changes in capital and operations. For example, major changes in capital equipment would probably be required before assets in the defense industries could contribute to the production of energy-related equipment such as drilling rigs, platforms, or pipe. High-temperature components made by the aircraft industry could more readily contribute to the production of compressor equipment for the gas pipeline projects. Increased production of turbines and transformers for electric power would also require shifts of skills and machinery to the civilian electrical equipment producers from the defense industries.

75. The materials used by defense plants could be redirected to alternative civilian production with greater ease. For example, powder metallurgy used in the production of munitions could be redirected to the production of drill bits for petroleum extraction. Increased availability of steel for drilling rigs and tubular goods could help the Soviets meet their oil drilling and gas output targets. In addition, special steels for the manufacture of turbine blades could increase the reliability of gas turbines used to power electric generators and pipeline compressors. Concrete, asphalt, and other construction materials would help to overcome the serious lack of infrastructure (all-weather roads, housing) in crucial areas of energy development such as West Siberia. Transfers of fuels, particularly petroleum products, from the military would also ease civilian production bottlenecks.

76. While there is the possibility of resource transfers from defense facilities, the atmosphere of increased East-West tensions—which would be likely to prevail after imposition of an embargo—might prompt Soviet leaders to raise even more the priority of defense programs in the allocation of resources. Should a weakening of the industrial base force some cuts in military programs, this would not happen quickly, and the effects on overall Soviet military capabilities would be very gradual.

V. WEST EUROPEAN PERSPECTIVES

A. Attitudes Toward East-West Trade and Trade Sanctions

77. In general the West Europeans believe that increased trade with the East is a fruit of detente and that it contributes to improved relations. They argue that Soviet behavior will be more restrained if the USSR has a large stake in the international economic system. Many West Europeans would therefore reject economic sanctions, arguing that they also hurt the West and do not affect Soviet behavior in any event. The problem lies in developing with the West European countries—or at least the major ones—a common understanding of the strategic implications of East-West trade and agreement on what kind of Soviet behavior should trigger what kind of response.

78. Despite statements to the contrary, Allied governments want to prevent the pipeline issue from affecting major initiatives in NATO, such as INF deployment. If the controversy is prolonged, however, it is likely to adversely affect the political climate in which final deployment decisions will be made. Moreover, it could reinforce the self-image of the West Europeans as junior partners in a relationship with the United States in which they have an equal stake. The pipeline ban could be seen in Western Europe as another in a series of US moves that have eroded European confidence in US leadership and intensified anxiety about US-Soviet relations. Although START and the INF talks have reduced European concerns about the US willingness to resume a dialogue with Moscow, the pipeline decision will contribute to uncertainty about how the United States will manage the East-West relationship. It will also nurture suspicion about the seriousness with which Washington will pursue arms control negotiations.

79. As a result of the era of detente, some West European political leaders generally have acquired more complacent attitudes toward the USSR. Furthermore, in their view, the superannuated Soviet leadership already is undergoing an uncertain struggle for succession and faces economic burdens that it can manage only with considerable difficulty. These West European political leaders, therefore, believe that it would be in the interest of their countries to adopt a less confrontational approach to Moscow in the hope of precluding the emergence of more intransigent leadership following Brezhnev's departure.

80. West European perceptions of the Soviet threat depend heavily on Soviet actions close to home. A direct intervention by the USSR in Poland or elsewhere in Eastern Europe would greatly harden West European attitudes, at least for a time. By contrast, Soviet actions in Afghanistan, Africa, and Central America, while unwelcome to West Europeans, are perceived as less of a threat and would not have much effect on Allied willingness to support US initiatives outside the treaty area.

B. The Pipeline Deal in West European Eyes

81. The West Europeans are convinced that the pipeline deal is a good one for them. In reaching this conclusion they are looking at the deal as a package, taking into account their projected energy needs and considering such aspects as the cost and reliability of Soviet gas, the cost of their export credit subsidies, and the export sales that are likely to result. They are convinced that they will need large additional gas supplies, especially in the 1990s. They have not focused extensively on what the additional gas revenue might do for Soviet military power, but they tend to argue that the Soviet military will get pretty much the resources it wants whether or not the pipeline is built. They are skeptical that it is in the West's interest to cause cutbacks in Moscow's consumer-oriented and civil investment expenditures, which they believe would suffer most if earnings from the pipeline were reduced or cut off.

82. The West Europeans' prime energy goal is to reduce their dependence on OPEC. While that dependence has fallen significantly since 1973 it is still high enough that a sustained OPEC embargo would

have a devastating impact. In searching for OPEC substitutes, the West Europeans obviously would prefer to find Western energy sources because of their reliability. It is partly for this reason that they plan to substantially expand their use of coal and nuclear power. Nevertheless, gas—used mainly for home heating—will be the primary fuel displacing OPEC oil, and there have been no alternative gas sources that could match the Soviet offer. West European gas producers have been neither willing nor able to expand production sufficiently in the 1980s, and potential non-European sources—such as Algeria, Nigeria, Qatar, Indonesia, and Canada—appear too unreliable or too expensive or both.

83. The West Europeans further believe that the Soviet gas deal is relatively advantageous in terms of security, flexibility, and price. (See inset below.)

84. The total number of jobs in Western Europe directly dependent on pipeline contracts is only 20,000 to 30,000. Nevertheless, these job losses are important because they are concentrated in key depressed industries.

85. All in all, the United States would have had a far better chance of aborting the pipeline project if it had weighed in earlier and stressed the strategic implications of East-West trade. The time to act probably was before mid-1980—the period when the West Europeans were evaluating the project. By the time Washington raised strong objections, the West European governments had already committed themselves to the deal and contract negotiations were well under way. In addition, the US arguments initially focused on the question of energy dependence on the USSR—the very issue that the West Europeans said

Advantages of the Pipeline Deal: A West European View

— ***Security.*** The deal provides the West Europeans with a 25-year gas supply from a partner that they consider more reliable than OPEC. They think that Moscow will deliver the gas on schedule both to maintain its hard currency earnings and to preserve its reputation as a reliable trade partner. Furthermore, they maintain that they have carefully considered the consequences of a Soviet cutoff. At the projected peak delivery levels of the pipeline currently being built, Western Europe as a whole will get only about 3 percent of its total energy supplies from Soviet gas, while West Germany—the largest purchaser—will get about 30 percent of its gas and 5 to 6 percent of its total energy supplies from the USSR. Planned gas storage capacity in Western Europe will equal about three months of Soviet imports by 1990, and many industrial gas users will have the capability of switching to other fuels. As a result, the West Europeans believe that they could cope with even a sustained Soviet gas cutoff without facing a major economic disruption.

— ***Flexibility.*** The Soviets also agreed to significant flexibility in gas deliveries. West Germany on 1 October will have a one-time option to permanently reduce the base amount of gas in its contract (10.5 billion cubic meters per year) by up to 20 percent. More important, each purchasing country in each year of the contract will have the right to reduce deliveries during that year up to 20 percent below the base amount.

— ***Price.*** The West Europeans were pleased by the price formula even though they will be paying more than the current market price for most gas. The contract apparently stipulates a base price of $4.65 per million BTUs, to be adjusted in proportion to future changes in oil prices, as well as a floor price of $5.40. The West Europeans will pay whichever is higher: $5.40 or the adjusted base price. The West Germans were particularly pleased that the adjustment formula is based 80 percent on the prices of heavy and light heating oil and only 20 percent on the price of crude. They believe that the prices of these products will rise less rapidly than crude prices in future years, because greater use of coal, gas, and nuclear power will hold down the demand for heating oil. Most current gas prices are below those in the Soviet contract but are rising rapidly: for example, West Germany in 1982 is paying an average of about $4.00 per million BTUs for imported gas, up 30 percent from 1981. Even at the $5.40 floor price, Soviet gas would be about 10 percent cheaper, on an energy-equivalent basis, than oil at $34 per barrel. Given that the Soviet gas deliveries will not reach full volume before 1987, and will continue through 2009, during which time oil prices are likely to rise far above current levels—if only because of world inflation—the West Europeans are confident that the bulk of the Soviet gas will be purchased at the adjusted base price, which will always be well below the equivalent crude oil price.

they had already studied carefully and resolved to their satisfaction.

C. Possible Areas of Compromise

86. While reiterating their intention to honor commitments already made to the USSR, most of the major suppliers see the necessity to tone down public polemics over the pipeline issue, minimize the damage to transatlantic relations, and seek some accommodation with the US position. Underlying this need is the realization that European firms—without American licenses—would be far less competitive in the world energy market. The four West European countries involved (France, West Germany, Italy, and the United Kingdom) have thus far failed to develop a common strategy with respect to US sanctions. Allied acceptance of any US package designed to achieve consensus on joint sanctions would be contingent on two essential criteria: (1) that the burden be shared evenly among the Western countries and (2) that the sanctions not be applied retroactively. Possible areas of compromise might include:

— ***The second strand of the pipeline.*** A second Soviet pipeline is an obvious candidate to meet Western Europe's projected gas shortfall in the 1990s, although there are no negotiations in prospect at the moment. The West Europeans would be concerned about substantially increasing their dependence on Soviet gas. The gas needs could be satisfied by some combination of other measures: conservation, substitution of other fuels, or other sources of gas. Norway, for example, could expand gas production enough to meet a large part of incremental West European needs in the 1990s, if development efforts are begun in the next few years. Given these possibilities, the West Europeans might be willing to renounce the Soviet option.

— ***Tighter credit restrictions.*** As noted earlier there is considerable support—particularly from West Germany—for ending subsidized interest rates on Soviet credits. The West Europeans paid some lipservice to the idea at Versailles and might now be pressed to act. The French have been the strongest opponents of higher interest rates, fearing—probably with good reason—that they would lose some Soviet sales as a result. Although supporting it on interest rates, the West German position is by no means wholly consonant with that of the United States. On government export guarantees, for example, Bonn argues strongly against their abolition—and is adamant that it will do nothing on this issue at least until subsidized export credits are limited by other West Europeans.

— ***Tighter COCOM restrictions.*** There is already some support in Western Europe for tighter controls, and the United States can present a compelling case that technology transfers are contributing significantly to Soviet military improvements. Purely out of self-interest, the West Europeans should see that these Soviet gains detract from their security and/or compel them to increase defense expenditures.

87. More important than compromise on these specific points, however, is the need to reach agreement on a shared understanding of the long-run strategic implications of East-West trade. Such an understanding has been notably absent in the past, but the time may now be ripe to achieve it. Although the sanctions imbroglio has heightened the serious differences between Western Europe and the United States regarding the linkage of economic and political policies, it has raised the West European consciousness of the issues and the depth of US concerns.

ANNEX

SOVIET DEPENDENCE ON US AND WESTERN OIL AND GAS EQUIPMENT

Exploration Equipment

1. Having drilled most of their easily accessible deposits, the Soviets now need Western seismic and well-logging technology to accelerate discovery of additional oil reserves for the remainder of the century. Soviet exploration equipment, however, with its dated technology and limited data-processing capabilities is poorly suited to the exploration of complicated geologic areas such as the potential petroleum-bearing regions in East Siberia, as well as to finding oil and gas in smaller, subtle geologic formations in the West Siberian basin. Soviet equipment is also inadequate for efficient offshore exploration, drilling, and production, lacking particularly the sophisticated positioning, stabilizing, and seabed production capabilities of Western equipment.

2. Western geophysical equipment would help the Soviets explore deeper, hard-to-find subtle traps. Modern Western seismograph software and hardware—digital recorders, cable, geophones, computers, field processors—would enable them to increase their processing capability and better locate potential hydrocarbon traps. Western well-logging equipment for drilling-fluid analysis and final borehole evaluation would improve both drilling efficiency and oil discovery rates.

Magnetometers and Gravity Meters

3. This equipment involves highly sophisticated sensing technology and data-processing capability. Remote areas, such as East Siberia, will be difficult to explore without this equipment. The USSR's technology in this area is perhaps 10 years behind that of the West. Skania of Sweden is the only known producer of this equipment outside the potential embargo group, and it is a small producer.

Seismic Equipment

4. Improved seismic equipment is necessary if the Soviets are to find smaller and deeper oil and gas deposits. The lack of this equipment will limit Soviet production five to seven years from now, as well as further in the future. If the Soviets try to develop their own seismic capability, the oil industry will need improved computer technology and additional R&D resources. Seismic equipment is available elsewhere, but the data-processing capability is closely held by Western firms.

Well-Logging Equipment

5. Improved well-logging equipment could greatly aid the Soviets in identifying and assessing new oil and gas deposits. As is the case with seismic equipment, well-logging tools could be produced within one to two years in countries outside the Western embargo group, but the all-important software, which is more tightly controlled, would not be available.

Drilling Equipment

6. Development of geologically complex and deep oil and gas reserves is consuming an increasing share of scarce resources throughout the USSR. In general, however, Soviet drilling equipment, characterized by poor metallurgy and manufacturing technology, is at a disadvantage relative to new Western equipment in working such deposits. Reservoirs of more than 3,000 meters are considered too deep for present Soviet turbodrills. A sustained embargo could substantially slow oil production in the early 1990s. Western blowout preventers and remote hydraulic controls are indispensable for controlling high pressure, corrosive gas when exploring and exploiting deep reserves. Western drill pipe, collars, and tool joints would be lighter and stronger and provide improved efficiency in deep drilling operations. These items would effectively extend the depth capability of existing rigs by at least 25 to 33 percent. Improved Western tungsten-carbide insert bits with sealed journal bearings would provide the Soviets with state-of-the-art cutting and bearing technology. The latter features determine

average bit life and the meters drilled per bit run. The longer the bit holds up, the fewer bits used per well. Changing the bit takes up to 66 percent of all deep drilling time. The Soviets change bits twice daily at 3,000-meter depths; US midcontinent drillers change bits about once a week.

Drill Pipe and Tool Joints

7. The Soviet Oil Ministry's plan for a 75-percent increase in drilling in 1981-85 will probably not be met, in part because of the insufficient quality and quantity of domestic drill pipe. The Soviets currently import substantial quantities of drill pipe. Countries outside NATO and Japan could fulfill only part of the need in the short run, but could expand production within one to two years. Increased Soviet production would require larger allocations of crude steel to the pipe mills. In such a situation the machine-building and metalworking sector would probably be the primary loser (it consumes some 40 percent of steel output).

Drill Bits

8. The Soviets badly need Western technical help in improving operations at a turnkey bit plant purchased from Dresser (US). If substantial improvements in the plant's operations are not forthcoming, imports of Western bits, which give 10 to 20 times longer bit life than normal Soviet bits, will have to be stepped up to meet drilling requirements.

Other Specialized Drilling Equipment

9. The United States produces a wide assortment of drilling tools that perform a variety of tasks such as retrieving broken drill pipe. Specialized tools contribute greatly to drilling efficiency when unexpected drilling problems arise. Greater use of such tools could lead to some increase in Soviet drilling efficiency. Much of this equipment requires special steel and precise machining and would be easier and probably less costly for the Soviets to import than to manufacture. Countries such as Austria and Finland could produce this equipment within one to two years, but it is questionable whether such firms would invest the effort based solely on the Soviet market.

Blowout Preventers (BOPs) and Controls

10. Most Soviet wells can be drilled using low-pressure Soviet or Romanian BOPs. The dangers inherent in drilling for high-pressure or high-sulfur gas, however, require the use of high-pressure BOPs with automatic controls. Although countries such as Sweden, Finland, or Mexico could produce this equipment in one to two years, an embargo would substantially hamper gas condensate development in West Siberia (high pressures) and Central Asia (high sulfur content) until then.

Production Equipment

11. The Soviets need production equipment for both old, developed fields and new undeveloped deep deposits. In both cases, the availability of the longer lived, more reliable Western items would be strongly to their advantage. Oil production is most affected by water encroachment at the Volga-Urals, Mangyshlak, and West Siberian fields. Large quantities of high-volume fluid-lift equipment is critical to maintaining oil output levels and improving oil recovery rates. New, undeveloped high-pressure, corrosive, and deep oil and gas deposits will require equipment made from special corrosion-resistant alloyed steel—wellheads, trees, casing, tubing valves, and the like. High subsurface pressures and temperatures cause many Soviet items to fail, and development of deep reserves at new fields—Tenghiz and Astrakhan—may be deferred or delayed if special Western equipment is not available.

Wellhead Assemblies, Downhole Completion Units, Casing, and Tubing

12. The situation with this type of equipment is almost identical to that with the blowout preventers. Soviet and East European equipment is adequate for most wells, but high-pressure gas production and high-sulfur gas production require speciality steels and different machining. Countries outside NATO and Japan could begin production of all of these items within one year. Soviet production of this equipment would require reallocation of scarce specialty steels.

Offshore/Arctic Equipment

13. A major effort to improve offshore oil and gas exploration and production capability has been

launched by the USSR. The Soviets purchased three drillships, two semisubmersible drilling platforms, and a full complement of US technology and equipment during the 1976-80 plan period. Offshore activities have been concentrated in the Soviet Gas Ministry, which will manage both oil and gas exploration and production. Exploration for oil will be the focus of offshore activity inasmuch as onshore Arctic gas reserves are abundant. However, the most promising offshore areas could be more gas-prone—for example, the Caspian, Azov, Kara, Baltic, Barents, and Okhotsk Seas. The icy waters of the Kara and Barents Seas have the most potential, but they present the most serious technical problems for exploitation. Ice flows could prevent year-round operations in all but parts of the western Barents. Also, pipelines to shore would still have to traverse Arctic permafrost areas.

Offshore Positioning Equipment, Tensioners, Risers, and Motion-Compensating Systems

14. Although most offshore drilling equipment is currently produced in countries outside NATO and Japan, essential positioning equipment is not. The lack of such equipment would cause moderate delays in the Soviet offshore drilling program, especially Arctic exploration. A country such as Finland would probably require two or more years to develop this technology. The Soviets would require several years more.

Pipeline Construction

15. Current and future Soviet plans for new pipeline construction are strongly biased toward natural gas, whose production has, thus far, been heavily dependent on Western large-diameter linepipe, pipelayers, turbine-compressors, ball valves, and controls. Western pipe-coating and wrapping materials are also needed. Soviet linepipe is unsuited for high-pressure natural gas transmission service in the Arctic. Domestic turbine-compressors, pipelayers, and valves are generally too small, or too limited in capacity to do the job efficiently. The Soviets, however, are currently attempting to improve the quality and capacity of these items. Similar efforts to upgrade technology in the past proved unsuccessful, but the Soviets' political prestige is now on the line as far as the export pipeline is concerned. Some improvements can be expected, but the Soviets will still need all the help they can get in building major gas trunklines.

Large-Diameter Pipe and Valves

16. Depending on the amount of Western large-diameter linepipe already in Soviet inventories, an embargo on pipe and valves could severely impede Soviet progess toward the USSR's goal of completing six 56-inch gas pipelines in 1981-85. The completion of one or two pipelines by 1985 might be prevented, reducing potential gas deliveries in that year as much as 45 billion cubic meters. The Soviets are developing their own large-diameter pipe, a multilayered pipe manufactured in short sections. Use of this pipe would entail a massive increase in the amount of welding required for joining pipe. In any event, production of this pipe almost certainly will be insufficient to cope with ambitious Soviet pipeline construction plans through the mid-1980s. Steel requirements for Soviet self-sufficiency in large-diameter pipe would be enormous. Although other countries, such as Sweden, could produce the pipe and valves, the existing large pipemill capacity in West Germany, Japan, and Italy might deter potential suppliers from undertaking large investment to supply the Soviets, who openly are trying to develop their own production capability.

Pipelayers

17. The United States, Japan, and Italy are currently the only producers of pipelayers large enough to handle the large-diameter gas pipe. Soviet production of such pipelayers is just beginning, and their quality is uncertain. The lack of Western pipelayers would slow the Soviet effort, although the impact is difficult to measure. A major uncertainty is the degree to which the service life of equipment is reduced under Soviet operating and maintenance conditions.

Compressors and Turbines

18. Western compressors with 25-megawatt gas turbines—a size the Soviets cannot yet serially produce—have been ordered for the Siberia–to–Western Europe pipeline. If expanded US sanctions were followed by the NATO countries and Japan, the Soviets could lose some 20 billion cubic meters of gas annually for one to two years. The Soviets have two principal options in the face of a full NATO and Japanese embargo—using smaller turbines built in the USSR or in countries outside NATO and Japan and perfecting their own 25-megawatt turbines.

Gas-Processing Equipment

19. Imported gas-processing equipment is necessary for developing the high-sulfur gasfields of Central Asia and Astrakhan. High-quality steels—an area in which the Soviets are deficient—are the main prerequisite for this producing equipment. Firms in countries such as Sweden could enter the market within one to two years.

Oil-Refining Equipment

20. The Soviets intend to expand their secondary refining capability substantially in the 1980s. Installation of additional secondary refining capacity will make refinery operations more efficient, and allow the Soviets to refine crude oils with higher sulfur content. Plans to substitute gas for oil would involve displacing heavy fuel oil from present uses and would be hampered by a Soviet inability to further refine heavy fuel oil. The heavy fuel oil currently comprises a large share of refinery output, and we anticipate that the export market for this product will continue to be unattractive to the Soviets.

21. While the Soviets are installing secondary refining equipment, they would probably like to obtain more Western units but may be constrained by hard currency shortages.

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